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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Samu Taulu

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EXAMINER

SUGLO, JANET L

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/572,570	Applicant(s) TAULU, SAMU	
	Examiner JANET L. SUGLO	Art Unit 2857	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 January 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 March 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>11/21/06</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Information Disclosure Statement

1. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. **Claims 1-18** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

With respect to **claims 1 and 9**, Applicant has not described in the specification in such a way to enable one of ordinary skill in the art to make and/or use the sensors or method tailored to measure an *irrotational* and *sourceless* (or a *curl free* and *divergence free*) (mentioned in claims 1 and 9)

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vector field. The specification mentions at page 1 (Field of the Invention), page 5 (fourth paragraph), and page 6 (first paragraph of the Detailed Description) that the irrotational and sourceless vector field is being measured but does not explain how this is done.

With respect to **claims 2-4 and 10-12**, Applicant has further not described in the specification in such a way to enable one of ordinary skill in the art to make and/or use the *multi-pole expansion calculation*. The specification mentions at page 4 (last paragraph on page) that the “multi-pole development can be calculated in two ways: by taking into account the magnetic fields emitted by sources outside the object being measured, or by ignoring them,” on page 5 (last paragraph on page) that calculations are arranged to calculate a multi-pole expansion from a multi-channel measurement signal, and further mentions on page 8 that “the switching field of the multi-pole coefficient M_{lm} is of the form [equation].” There is no place in the specification that explicitly teaches how to carry out the multi-pole expansion calculation. The closest that the specification comes to an explanation is on the top of page 8 where the form of the coefficient is given, however the coefficient does not appear in the given equation (2). An actual equation is never given for calculating a multi-pole expansion of the field.

Claims 5-8 and 13-18 are rejected under 35 U.S.C. 112, first paragraph, because they incorporate the lack of enablement present in parent claims 1 and 9.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

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The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. **Claims 1 - 18** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "efficiently" in **claim 1** is a relative term which renders the claim indefinite. The term "efficiently" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. There is no explanation in the specification as to how the calculation is done *efficiently*.

The term "freely" in **claims 6, 7, 13, and 14** is a relative term which renders the claim indefinite. The term "freely" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. There are no criteria which have been presented as to how the function is *freely* selected.

With respect to **claim 6**, an equation has been provided with multiple variables that have not been defined. The following variables have not been defined: $\vec{J}(\vec{r}), L, l, m$.

With respect to **claim 7**, an equation has been provided with multiple variables that have not been defined. The following variables have not been defined: C_{lm}, l, r^{l+2} .

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With respect to **claim 9**, it is unclear what “2, 2¹, 2², ... 2ⁿ” in line 6 represent. It appears that Applicant means for the numbers to represent sensors, however the manner in which the claim has been written renders the claim unclear. For the purposes of this Office Action, it will be assumed that “2, 2¹, 2², ... 2ⁿ” represent a plurality of measurement sensors.

Further with respect to **claim 9**, it is unclear what to which sensors the phrase “which sensors are mutually orthogonal” in line 11 are referring. It is unclear whether the above mentioned phrase is referring to the claimed measurement sensors or the virtual sensors. For the purposes of this Office Action, it will be assumed that the phrase is referring to the virtual sensors.

With respect to **claim 13**, an equation has been provided with multiple variables that have not been defined. The following variables have not been defined: $\vec{J}(\vec{r}), L, l, m$.

With respect to **claim 14**, an equation has been provided with multiple variables that have not been defined. The following variables have not been defined: $C_{lm}, l, M_{lm}, r^{l+2}$.

With respect to **claim 18**, the limitations in claim 18 fail to further limit claim 9 from which it depends. Lines 7 and 8 of claim 9 are identical to the limitations of claim 18.

Claims 2-5, 8, 10-12, and 15-17 are rejected under 35 U.S.C. 112, second paragraph, because they incorporate the lack of clarity present in parent claims 1 and 9.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this

Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. **Claims 1-5, 9-12, and 16-18** are rejected under 35 U.S.C. 102(b) as being anticipated by Robinson (US Patent 6,370,414) as may best be understood.

With respect to **claim 1**, Robinson teaches a method for determining a current distribution of an object (col 1, ln 12-17), the method comprising:

measuring the magnetic fields in vicinity of the object using a multi-channel measurement device that measures an irrotational and sourceless vector field, whereby one measurement sensor corresponds to each channel (col 5, ln 66-67);

converting a multi-channel measurement signal corresponding to each measurement sensor into the-signals of a predetermined set of virtual sensors (col 5, ln 42-46); and

determining the current distribution of the object being measured from the signals of the set of virtual sensors in a predetermined function basis to be efficiently calculated (col 5, ln 42-45; col 11, ln 13-15).

The ability of the multi-channel measurement device to measure an irrotational and sourceless vector field is interpreted in this Office Action as an intended use limitation such that the device is able to measure any vector field.

With respect to **claim 2**, Robinson teaches the object is approximated using a conductor, and a multi-pole expansion of the field is calculated from the multi-channel measurement signal (col 11, ln 13-15; col 11, ln 25-37; col 11, ln 41-56).

With respect to **claim 3**, Robinson teaches the multi-pole expansion is calculated by taking into account magnetic fields emitted by sources outside the object (col 11, ln 57-67).

With respect to **claim 4**, Robinson teaches the multi-pole expansion is calculated by ignoring magnetic fields emitted by sources outside the object (col 11, ln 6-8).

With respect to **claim 5**, Robinson teaches the external interferences are eliminated prior to the step of converting (col 11, ln 57-67).

With respect to **claim 9**, Robinson teaches a measurement device for determining a current distribution of an object by measuring magnetic fields in a

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vicinity of the object (Figure 2; col 1, ln 12-17), the measurement device comprising:

a set of measurement channels ($1, 1^1, 1^2, \dots, 1^n$) that measure a curl free and divergence free vector field, in which case at least one measurement sensor $2, 2^1, 2^2, \dots, 2^n$ corresponds to each channel (col 5, ln 66-67);

processing means for processing a measurement signal in which the object is approximated using a spherical-symmetrical conductor (col 9, ln 7-9; col 9, ln 53-59; col 11, ln 13-56), wherein

the processing means include a conversion module for converting a multi-channel measurement signal corresponding to each measurement sensor into signals of a predetermined set of virtual sensors, which sensors are mutually orthogonal (col 5, ln 42-46); and

calculation means for determining the current distribution of an object being examined from the set of virtual sensors using depth r in a predetermined orthonormal function basis (Figure 4; col 11, ln 5-15; col 12, ln 54-61).

The ability of the measurement channels to measure a curl free and divergence free vector field is interpreted in this Office Action as an intended use limitation such that the measurement channels is able to measure any vector field.

With respect to **claim 10**, Robinson teaches the calculation means are arranged to calculate a multi-pole expansion from the multi-channel measurement signal (col 11, ln 13-15; col 11, ln 25-37; col 11, ln 41-56).

With respect to **claim 11**, Robinson teaches the multi-pole expansion is calculated by taking into account magnetic fields emitted by sources outside the object (col 11, ln 57-67).

With respect to **claim 12**, Robinson teaches the multi-pole expansion is calculated by ignoring magnetic fields emitted by sources outside the object (col 11, ln 6-8).

With respect to **claim 16**, Robinson teaches the measurement device converts the signals into a set of virtual sensors prior to storage, and analysis software converts the stored data into a current distribution (col 8, ln 16-30).

With respect to **claims 17 and 18**, Robinson teaches the object is approximated using a spherically symmetric conductor (col 11, ln 25-40).

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Gevins et al. (US Patent 4,736,751) teaches a brain wave source network location scanning method and system.

Robinson et al. (US Patent 4,977,896) teaches an analysis of biological signals using data from arrays of sensors.

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Tomita et al. (US Patent 5,671,740) teaches a method and apparatus for deducing bioelectric current sources.

Dossel et al. (US Patent 5,644,229) teaches a method of determining the spatial field distribution.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JANET L. SUGLO whose telephone number is (571)272-8584. The examiner can normally be reached on Mon, Wed, Thur, Fri from 6:30am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eliseo Ramos-Feliciano can be reached on 571-272-7925. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. L. S./
Examiner, Art Unit 2857

/Jeffrey R. West/
Primary Examiner, Art Unit 2857